

# **A Cascade Extracting and Solvent Refreshing Method for Recycling Jelly Cables**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the invention**

5       The present invention relates to method of continuously collecting jelly compounds from jelly filled cable by recycling operation of solvent, and more particularly, to method of collecting jelly compounds from jelly filled cable by repeatedly heating, cleaning and condensing the recycling solvent used to  
10   dissolve the jelly compounds and jelly filled contained in the refuse cable so as to achieve the aims of saving the consumption of solvent and the heat energy as well.

### **2. Description of the Prior Art**

15       In the method of collecting jelly contained in the jelly filled cable disclosed in Taiwan Pat. No.414731 (called cited case hereinafter), the operation is carried out at room temperature, operating time is above 3 minutes, the solvent used for deoiling  
20   can not be repeatedly operated for more than 5 times, the used solvent can not be perfectly cleaned for reuse, and the jelly compounds cleaned out of the jelly filled cable are mixed with the solvent to form a harmful slurry resulting in second time public nuisance.

25       With the above mentioned shortcoming, the method provided by the cited case is by no means a perfect one, and some

improvements are necessary.

Aiming at the above depicted situation, the present invention is to propose a newly developed method that is able to continuously collecting jelly compounds from jelly filled cable by recycling operation of solvent which is the result of the present inventor's intensive research based on many years of experimentation and improvement and now will be disclosed hereinafter.

## 10 SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a method of collecting jelly compounds from jelly filled cable wherein by heating the solvent to increase the solubility of the jelly compounds so as to easily deprive the jelly compounds from of the jelly filled cable.

It is another object of the present invention to provide a method of collecting jelly compounds from jelly filled cable wherein the purified solvent can be retrieved in the vaporized form every time it has performed one round of collecting jelly compounds from the jelly filled cable so that it can be re-used as a new one.

It is still another object of the present invention to provide a method of collecting jelly compounds from jelly filled cable wherein the vaporized solvent during the operation never be dissipated to causes additional public nuisance.

It is a further object of the present invention to provide a method of collecting jelly compounds from jelly filled cable

wherein the collected jelly compounds can be separated from the solvent by the step of distillation and concentration for reuse.

To achieve these and other object mentioned above, the method of the present invention essentially comprises the steps of heating and condensing the solvent to prepare a purified solvent for cleaning the jelly filled cable; resolving the jelly compounds contained in the jelly filled cable by boiling solvent; and evaporating and condensing the mixture of the solvent and the jelly compounds to separate and collect them respectively for reuse.

For fully understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawing.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a schematic view of the equipment for performing method of the present invention.

## **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Tables I and II show the composition of a representative jelly filled cable, and the composition of the filled materials contained in the same cable respectively.

(w/w%) Table I

Composition	Cable A	Cable B
Wrapping paper, plastic tape	2.8	0.7
Wrapping paper	0	1.3
PE insulation	5.6	5.4
Copper conductor	42.3	52.0
Jelly compounds	10.5	9.7
Black PE sheath	28.0	21.8
Laminated Al sheath	10.8	9.1

Table II

Jelly filled cable	Type of jelly compounds	MSDS data	Major components
A	petroleum jelly	poly butane 70%, mineral oil 15% polyethylene 14%, antioxidant 1%	poly butane, mineral oil
B	petrolatum	base oil, petroleum derived, microcrystalline waxes, and non hazardous polymers.	petroleum, waxes, mineral oil

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Fig. 1 is a schematic view of the equipment for performing method of the present invention, the equipment includes; a cleaning tank 1, an evaporation and concentration tank 2, a

condenser 3, a vapor pipe 4, a liquid transportation pipe 5, a first heater 6, a second heater 7, and an agitator 8, and the method comprises the following steps:

1. Tell jelly filled cable was cut apart and the outer sheath removed, putting the jelly filled cable core 9 in a perforated basket, and then setting the basket in the cleaning tank 1.

2. Transferring the solvent into the evaporation and concentration tank 2 and heating the solvent with the first heater 6 until the solvent boils, and conducting the vaporized solvent into the condenser 3 via the vapor pipe 4 so as to perform heat exchange between the vapor pipe 4 and the cleaning tank 1 thereby heating up the cleaning tank 1. The solvent may be a aliphatic organic solvent.

3. Condensing the vaporized solvent with the condenser, and then conducting the condensed solvent into the cleaning tank 1.

4. Immersing the jelly filled cable core 9 in the solvent having the liquid/solid ratio of 2/1(v/w), heating the cleaning tank 1 with the vapor pipe 4 preferable at a operating temperature from the room temperature up to the solvent boiling point employing the second heater 7 as an auxiliary means for temperature control, and agitating the solvent with the agitator 8 at 20 rpm so as to dissolve the jelly compounds. The cleaning time shall be maintained at least 3 minutes after the jelly filled cable 9 has been completely immersed in the solvent. Afterwards discharging the solution containing the jelly compounds into the evaporation and concentration tank 2 via the liquid transportation pipe 5. If the

slurry contained in the evaporation and concentration tank 2 exceeds 50% of the solution, the solution should be transferred to a separate evaporator means for separation by concentration so to retrieve the solvent for reuse and jelly compound was recovered.

5        5.Heating the evaporation and concentrallion tank 2 so as to concentrate and accumulate the deprived jelly compounds in the evaporation and concentration tank 2. The vaporized solvent is returned to the cleaning tank 1 after being condensed for reuse.

6.Repeating the step 2 to step 5 so as to continuously collect  
10 jelly compounds from jelly filled cable by recycling operation of solvent.

In this version, the method of the present invention is able to deprive jelly compounds of the jelly filled cable by repeatedly heating, cleaning and condensing the recycling solvent used to  
15 dissolve the jelly compounds contained in the jelly filled cable with minimum consumption of the solvent and heat energy as well.

The chemical structure and the physical properties of the recycling solvent employed by the present invention is listed in Table III , and the relation of recycling time of the solvent versus  
20 percentage amount of collection is shown in Table IV .

Table III

	chemical structure	Boiling point	Flash point
n-hexane	$C_6H_{14}$	69°C	-22°C
n-heptane	$C_7H_{16}$	98.4°C	-4°C

Table IV

Recycling solvent		n-heptane	n-hexane
Cable A	first cycle	97.4	96.3
	second cycle	2.1	2.8
	third cycle	0.5	0.9
Cable B	first cycle	96.0	94.5
	second cycle	2.9	4.5
	third cycle	1.1	1.0

It emerges from the description of the above example that the invention has several noteworthy advantages over the prior art, in particular:

5        1.The combination process of heated dissolving, solvent vapor condensing and evaporating concentration that employed by the present invention result in performing the operation effectively with less solvent and energy consumption.

2.The efficiency of jelly extraction was enhanced and  
10 accelerated by repeated flushing of refreshed solvent in an elevated temperature environment.

3.That the aims of purifying the recycling solvent and separating the concentrated collecting objects are efficiently achieved by solvent distillation and separation process.

15        4.That the disadvantage of producing large amount of slurry after cleaning process which might lead to an extra public nuisance inherent to the conventional technique can be surely avoided.

The comparison of the present invention with the cited case (Taiwan Pat No. 414731) is enumerated in Table V

	Cited case	The present invention
Operation temp for collection	Room temp.	Solvent boiling point nearly reaches the critical temp for improving solubility
Cleaning times	Once	Several times(can be predetermined)
Possible recycling times for solvent	Less than 5 times	Unlimited
Retrieving of solvent	Impossible	Can be retrieved for reuse
Jelly compounds collection	impossible	Collection for reuse is surely possible by concentrating to separate.

Many changes and modifications in the above described embodiment of the invention can, of course, be carried out without departing from the scope thereof. Accordingly, to promote the progress in science and the useful art, the invention is disclosed and is intended to be limited only by the scope of the appended claims.